

Doc. Number :

- ☐ Tentative Specification
☐ Preliminary Specification
☒ Approval Specification

MODEL NO.: M220ZGE
SUFFIX: L20

Customer:**APPROVED BY****SIGNATURE****Name / Title** _____

Note

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Please return 1 copy for your confirmation with your signature and comments.

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**REVISION HISTORY**

Version	Date	Page	Description
2.0	Sep.14, 2011	All	Spec Ver.2.0 was first issued.



1. GENERAL DESCRIPTION

1.1 OVERVIEW

The M220ZGE-L20 model is a 22 inch wide TFT-LCD slimming module with a WLED light bar Backlight Unit and a 30-pin 2ch-LVDS interface. This module supports 1680 x 1050 WSXGA⁺ (16:10 wide screen) mode and displays up to 16.7 millions colors. The converter module for the Backlight Unit is not built in.

1.2 GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Screen Size	22	inch	
Driver Element	a-Si TFT active matrix	-	-
Pixel Number	1680 x R.G.B. x 1050	pixel	-
Pixel Pitch	0.282(H) x 0.282(V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	16.7 millions	color	-
Transmissive Mode	Normally White	-	-
Surface Treatment	Hard coating (3H), AG (Haze 25%)	-	-
Luminance, White	250 (typical)	Cd/m2	
Color Gamut	72% of NTSC(Typ.)	-	-
TCO	TCO5.0 compliance	-	-
Power Consumption	Total 15.76W (Max.) @ cell 4.5W (Max.), BL 11.26W (Max.)		(1)

Note (1) The specified power consumption : Total= cell (reference 4.3.1)+BL (reference 4.3.3)

2. MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	493.2	493.7	494.2	mm	(1)
	Vertical (V)	319.6	320.1	320.6	mm	
	Thickness (T)	10.5	11	11.5	mm	
Bezel Area	Horizontal	477.4	477.7	478	mm	
	Vertical	299.8	300.1	300.4	mm	
Active Area	Horizontal	-	473.76	-	mm	
	Vertical	-	296.1	-	mm	
Weight		-	2100	2250	g	

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

3. ABSOLUTE MAXIMUM RATINGS

3.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	TST	-20	+60	°C	(1)
Operating Ambient Temperature	TOP	0	+50	°C	(1), (2)

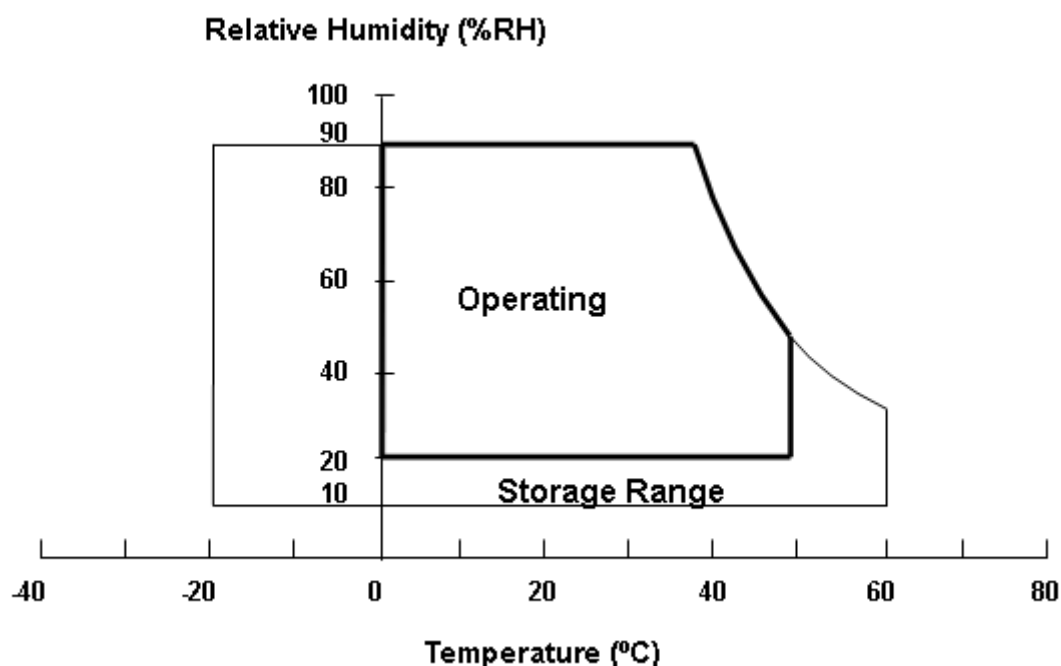
Note (1)

(a) 90 %RH Max. (Ta ≤ 40 °C).

(b) Wet-bulb temperature should be 39 °C Max. (Ta > 40 °C).

(c) No condensation.

Note (2) The temperature of panel surface should be 0 °C min. and 60 °C max.



3.2 ELECTRICAL ABSOLUTE RATINGS

3.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	VCCS	4.5	5.5	V	(1)
Logic Input Voltage	V _{IN}	-0.3	3.6	V	

3.2.2 BACKLIGHT UNIT

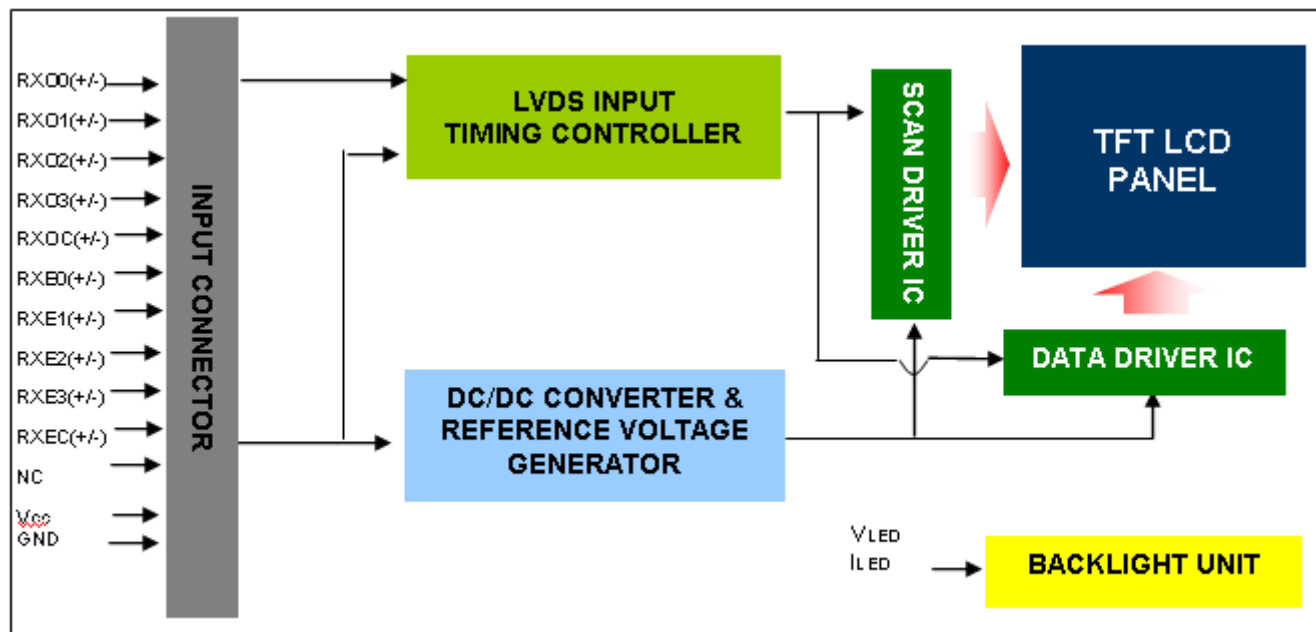
Item	Symbol	Value			Unit	Note
		Min.	Typ	Max.		
LED Forward Current Per Input Pin	I _F	---	65	69	mA	(1), (2) Duty=100%
LED Pulse Forward Current Per Input Pin	I _P	---	---	150	mA	(1), (2) Pulse Width ≤ 10msec. and Duty ≤ 30%

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for input pin of LED light bar at Ta=25±2 °C (Refer to 4.3.3 and 4.3.4 for further information).

4. ELECTRICAL SPECIFICATIONS

4.1 FUNCTION BLOCK DIAGRAM



4.2. INTERFACE CONNECTIONS

PIN ASSIGNMENT

Pin	Name	Description
1	RX00-	Negative LVDS differential data input. Channel O0 (odd)
2	RX00+	Positive LVDS differential data input. Channel O0 (odd)
3	RX01-	Negative LVDS differential data input. Channel O1 (odd)
4	RX01+	Positive LVDS differential data input. Channel O1 (odd)
5	RX02-	Negative LVDS differential data input. Channel O2 (odd)
6	RX02+	Positive LVDS differential data input. Channel O2 (odd)
7	GND	Ground
8	RX0C-	Negative LVDS differential clock input. (odd)
9	RX0C+	Positive LVDS differential clock input. (odd)
10	RX03-	Negative LVDS differential data input. Channel O3(odd)
11	RX03+	Positive LVDS differential data input. Channel O3 (odd)
12	RXE0-	Negative LVDS differential data input. Channel E0 (even)
13	RXE0+	Positive LVDS differential data input. Channel E0 (even)
14	GND	Ground
15	RXE1-	Negative LVDS differential data input. Channel E1 (even)
16	RXE1+	Positive LVDS differential data input. Channel E1 (even)
17	GND	Ground
18	RXE2-	Negative LVDS differential data input. Channel E2 (even)
19	RXE2+	Positive LVDS differential data input. Channel E2 (even)
20	RXEC-	Negative LVDS differential clock input. (even)
21	RXEC+	Positive LVDS differential clock input. (even)
22	RXE3-	Negative LVDS differential data input. Channel E3 (even)
23	RXE3+	Positive LVDS differential data input. Channel E3 (even)
24	GND	Ground
25	NC	For LCD internal use only, Do not connect

26	NC	For LCD internal use only, Do not connect
27	NC	For LCD internal use only, Do not connect
28	Vcc	+5.0V power supply
29	Vcc	+5.0V power supply
30	Vcc	+5.0V power supply

Note (1) Connector Part No.:

GS23302-0311R-7H (FOXCONN) or WF13-422-3033 (FCN) or equivalent

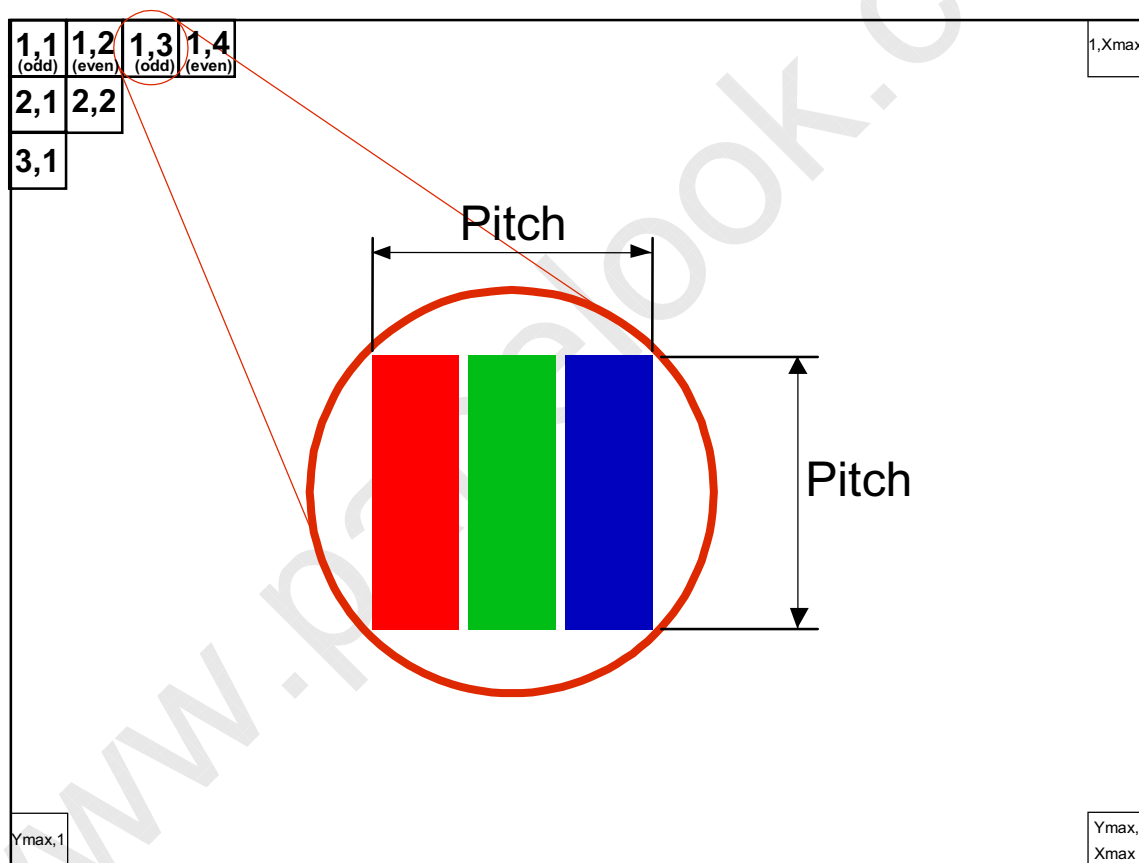
Note (2) User's connector Part No:

Mating Wire Cable Connector Part No.: FI-X30H(JAE) or FI-X30HL(JAE)

Mating FFC Cable Connector Part No.: 217007-013001 (P-TWO) or JF05X030-1 (JAE).

Note (3) The first pixel is odd.

Note (4) Input signal of even and odd clock should be the same timing.



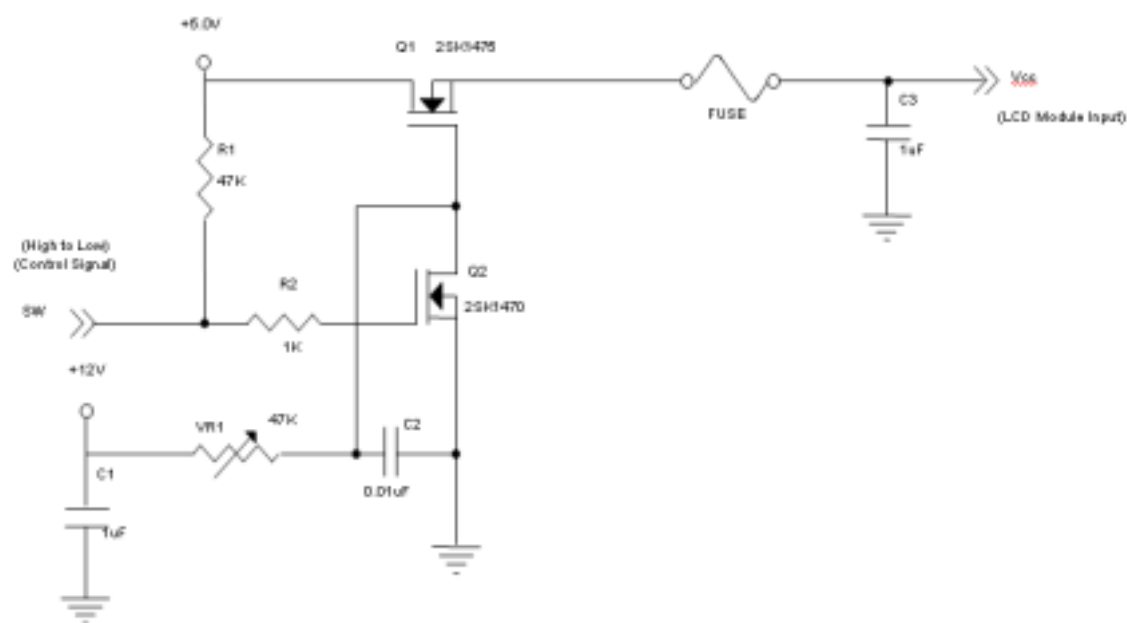
4.3 ELECTRICAL CHARACTERISTICS

4.3.1 LCD ELETRONICS SPECIFICATION

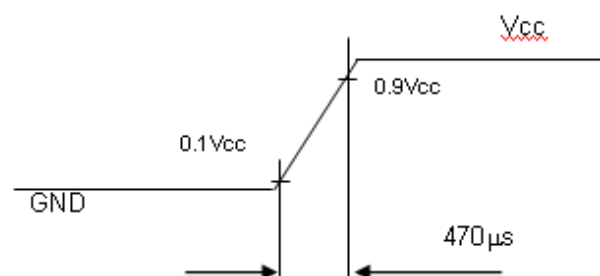
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V _{CC}	4.5	5.0	5.5	V	-
Ripple Voltage	V _{RP}	-	--	300	mV	-
Rush Current	I _{RUSH}	-	--	3	A	(2)
Power Supply Current	White	-	0.36	0.52	A	(3)a
	Black	-	0.65	0.90	A	(3)b
	Vertical Stripe	-	0.4	0.6	A	(3)c
Power Consumption	PLCD	-	3.25	4.5	Watt	(4)
LVDS differential input voltage	V _{id}	100	-	600	mV	
LVDS common input voltage	V _{ic}	-	1.2	-	V	
Logic High Input Voltage	V _{IH}	2.0	-	-	V	
Logic Low Input Voltage	V _{IL}	-	-	0.8	V	

Note (1) The ambient temperature is $T_a = 25 \pm 2^\circ\text{C}$.

Note (2) Measurement Conditions:



VCC rising time is 470μs



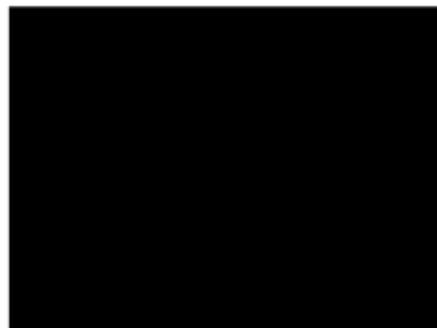
Note (3) The specified power supply current is under the conditions at $V_{CC} = 5.0\text{ V}$, $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$, $F_r = 75\text{ Hz}$, whereas a power dissipation check pattern below is displayed.

a. White Pattern



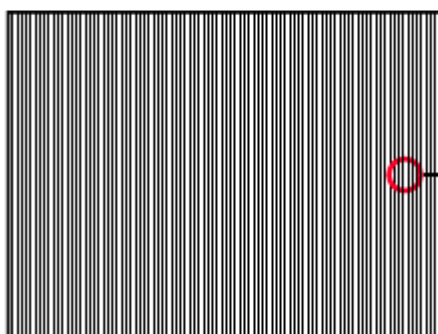
Active Area

b. Black Pattern

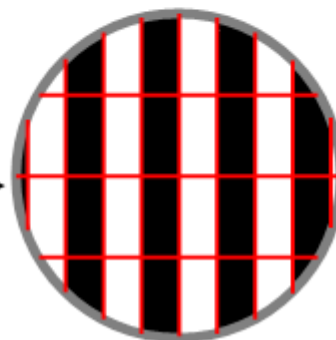


Active Area

c. Vertical Stripe Pattern



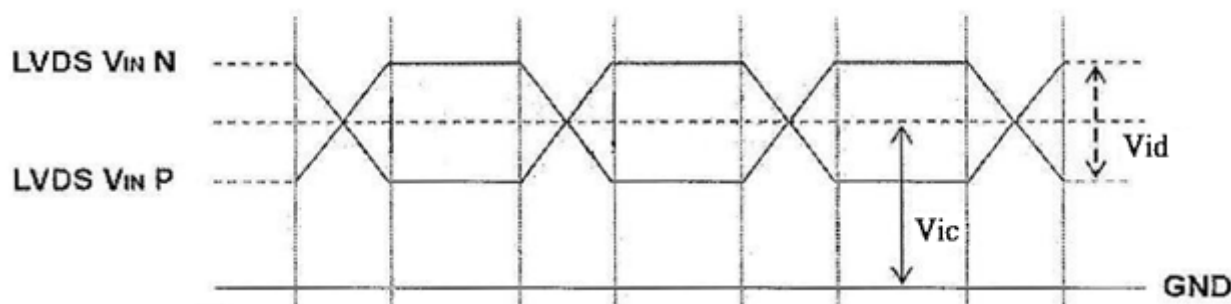
Active Area



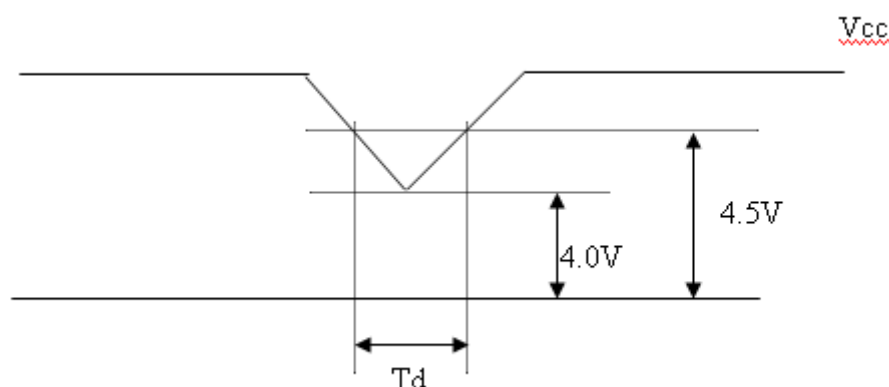
Note (4) The power consumption is specified at the pattern with the maximum current.

Note (5) VID waveform condition

Single-End



4.3.2 Vcc Power Dip Condition



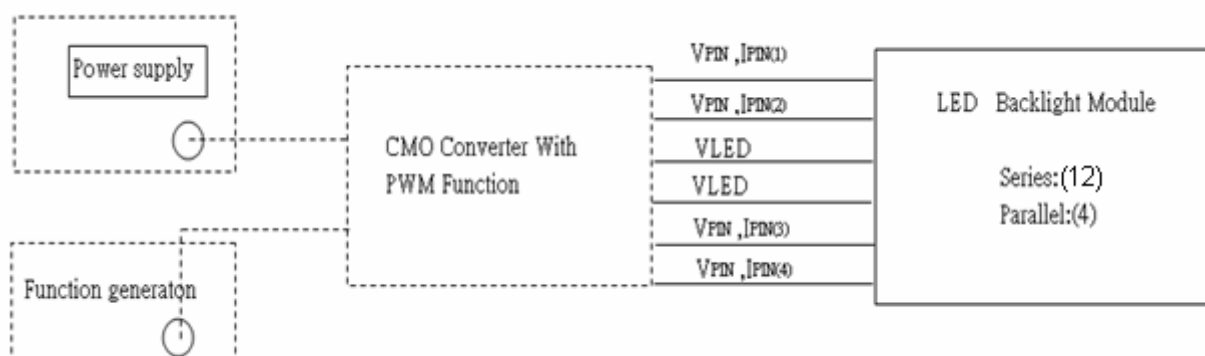
4.3.3 BACKLIGHT UNIT

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Light Bar Input Voltage Per Input Pin	VPIN	---	37.2	40.8	V	(1), Duty=100%, IPIN=65mA
LED Light Bar Current Per Input Pin	IPIN	---	65	69	mA	(1), (2) Duty=100%
LED Life Time	LLED	40000			Hrs	(3)
Power Consumption	PBL	---	9.67	11.26	W	(1) Duty=100%, IPIN=65mA

Note (1) LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below:

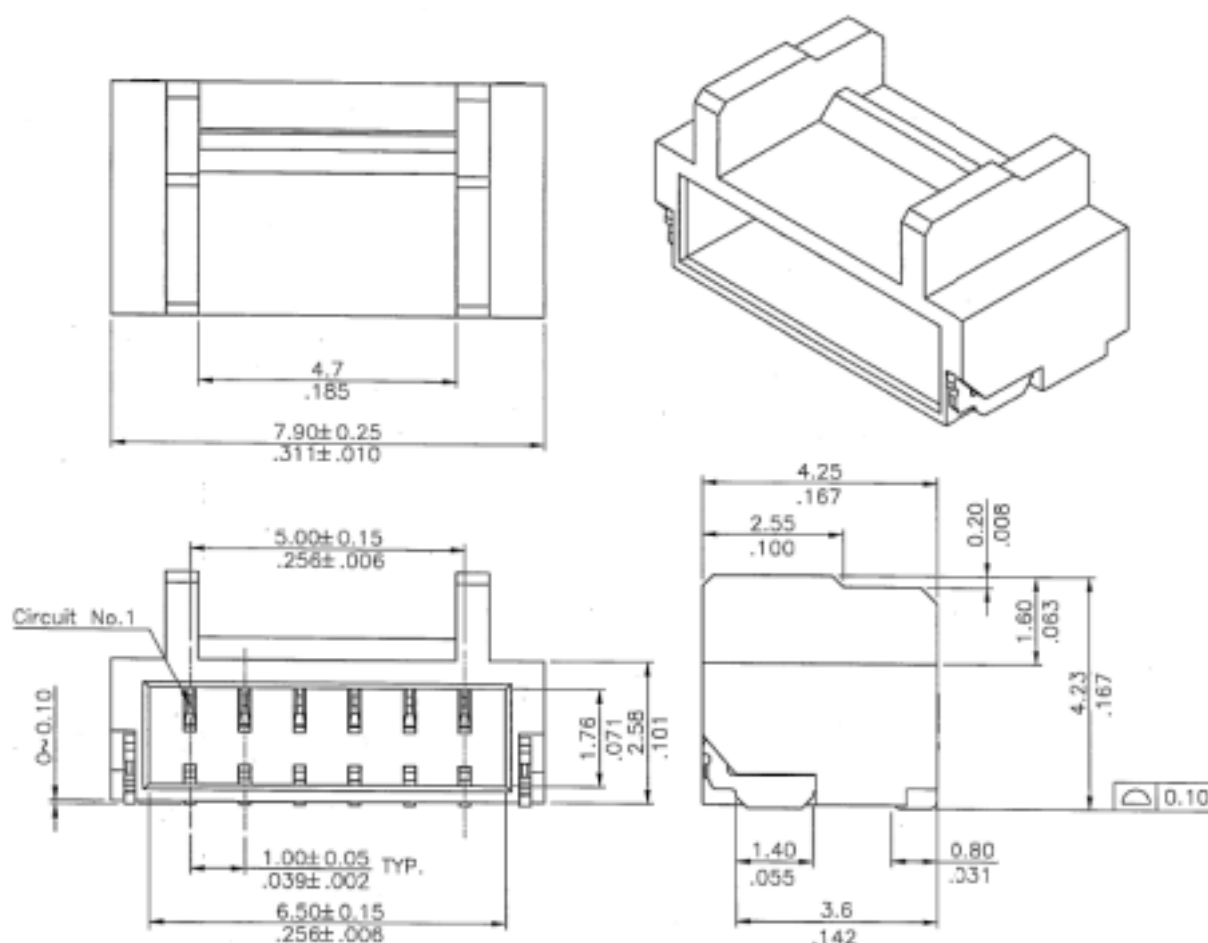
Note (2) $PBL(Typ) = IPIN(Typ) \times VPIN(Typ) \times (4)$, $PBL(Max) = IPIN(Max) \times VPIN(Max) \times (4)$, LED light bar circuit is (12)Series, (4)Parallel.

Note (3) The lifetime of LED is defined as the time when LED packages continue to operate under the conditions at $T_a = 25 \pm 2^\circ C$ and $I = 65\text{ mA}$ (per chip) until the brightness becomes $\leq 50\%$ of its original value.



4.3.4 LIGHTBAR Connector Pin Assignment

Connector: WM13-406-063N (FCN) or Compatible



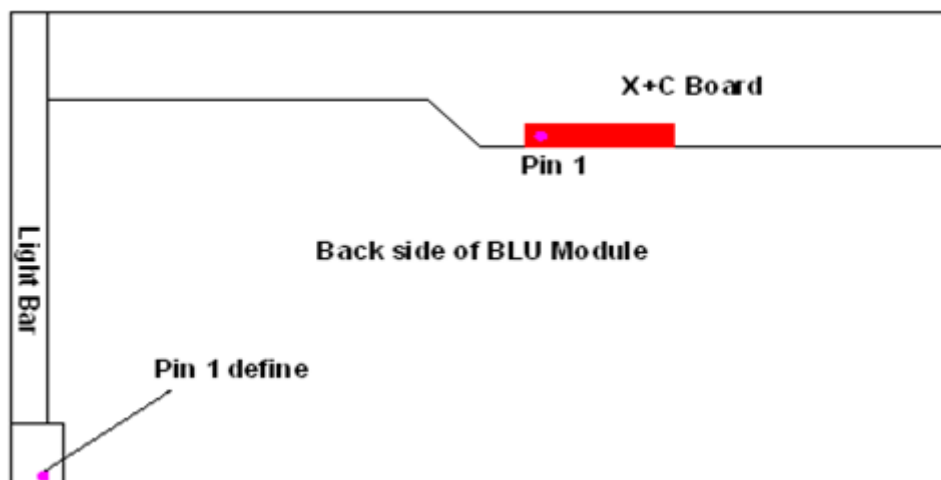
CN1

Pin number	Description
1	Cathode of LED string1
2	Cathode of LED string2
3	VLED
4	VLED
5	Cathode of LED string3
6	Cathode of LED string4

Note (1)Connector: WM13-406-063N (FCN) or Compatible

(2) User's Mating Connector Part No.: WM13-406-063N (FCN) or Compatible.

4.4 LVDS INPUT SIGNAL SPECIFICATIONS



4.4.1 LVDS DATA MAPPING TABLE

LVDS Channel O0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	OG0	OR5	OR4	OR3	OR2	OR1	OR0
LVDS Channel O1	LVDS output	D18	D15	D14	D13	D12	D9	D8
	Data order	OB1	OB0	OG5	OG4	OG3	OG2	OG1
LVDS Channel O2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	OB5	OB4	OB3	OB2
LVDS Channel O3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	OB7	OB6	OG7	OG6	OR7	OR6
LVDS Channel E0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	EG0	ER5	ER4	ER3	ER2	ER1	ER0
LVDS Channel E1	LVDS output	D18	D15	D14	D13	D12	D9	D8
	Data order	EB1	EB0	EG5	EG4	EG3	EG2	EG1
LVDS Channel E2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	EB5	EB4	EB3	EB2
LVDS Channel E3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	EB7	EB6	EG7	EG6	ER7	ER6



4.4.2 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

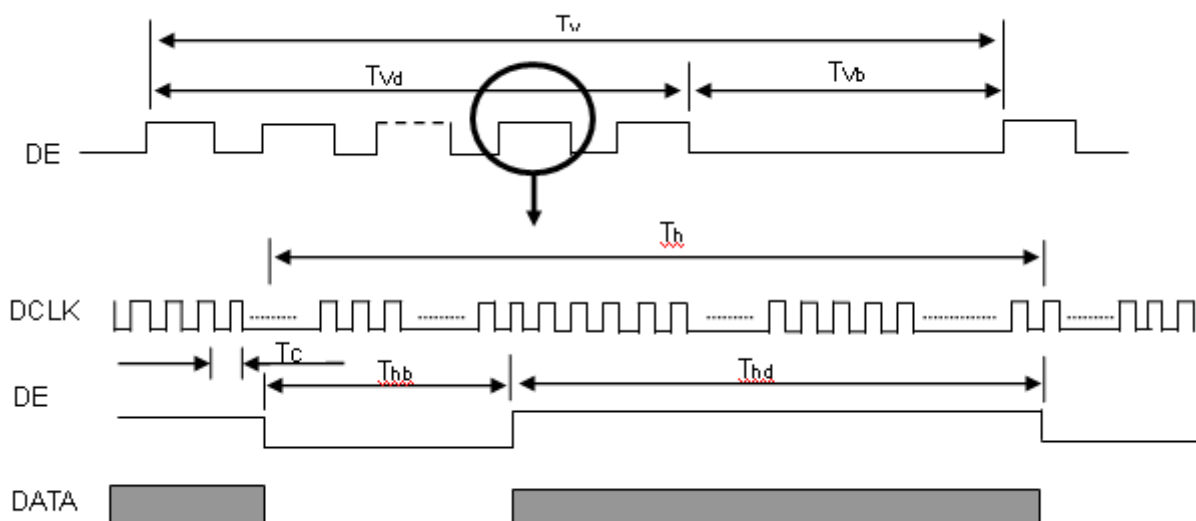
4.5 DISPLAY TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

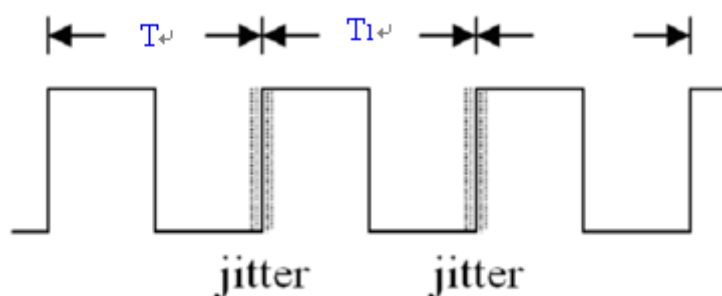
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Clock	Frequency	F _c	49	60	77	MHz	-
	Period	T _c	13	16.7	20	ns	
	Input cycle to cycle jitter	T _{rcl}	-0.02*T _c	-	0.02*T _c	ps	(1)
	Input Clock to data skew	TLVCCS	-0.02*T _c		0.02*T _c	ns	(2)
	Spread spectrum modulation range	F _{clkin_mod}	0.97*F _c	-	1.03*F _c	MHz	(3)
	Spread spectrum modulation frequency	F _{SSM}	-	-	100	KHz	
Vertical Display Term	Frame Rate	Fr	50	60	76	Hz	T _v =T _{vd} +T _{vb}
	Total	T _v	1077	1080	1090	Th	-
	Active Display	T _{vd}	1050	1050	1050	Th	-
	Blank	T _{vb}	T _v -T _{vd}	30	T _v -T _{vd}	Th	-
Horizontal Display Term	Total	T _h	910	920	929	Tc	T _h =T _{hd} +T _{hb}
	Active Display	T _{hd}	840	840	840	Tc	-
	Blank	T _{hb}	T _h -T _{hd}	80	T _h -T _{hd}	Tc	-

Note: Because this module is operated by DE only mode, Hsync and Vsync input signals are ignored.

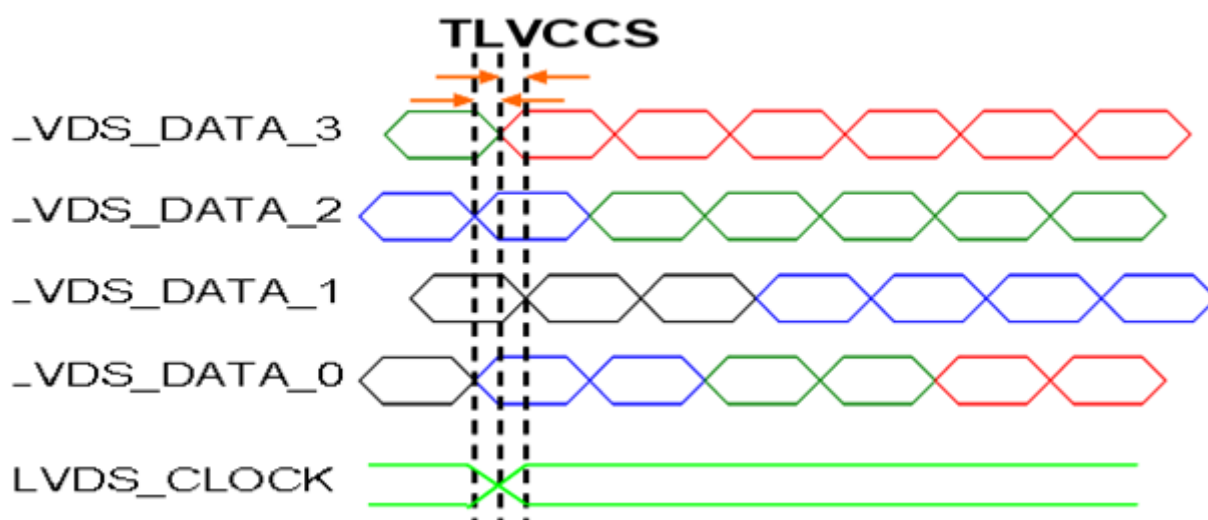
INPUT SIGNAL TIMING DIAGRAM



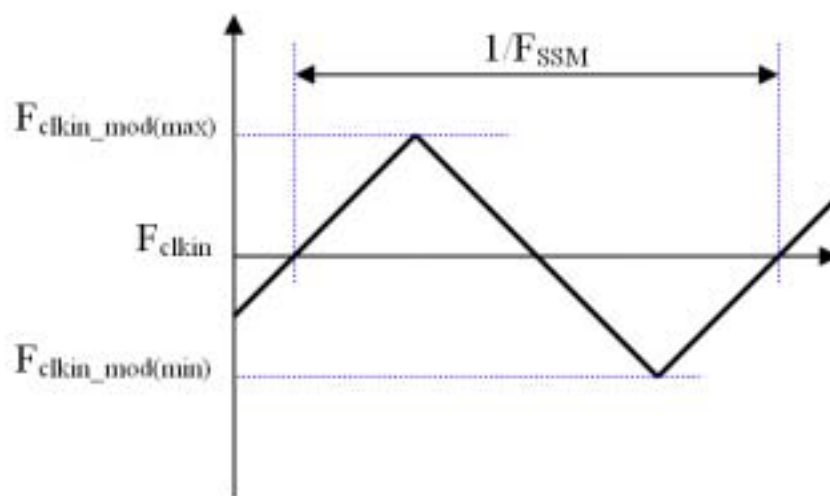
Note (1) The input clock cycle-to-cycle jitter is defined as below figures. $Trcl = |T_1 - T_1|$



Note (2) Input Clock to data skew is defined as below figures.

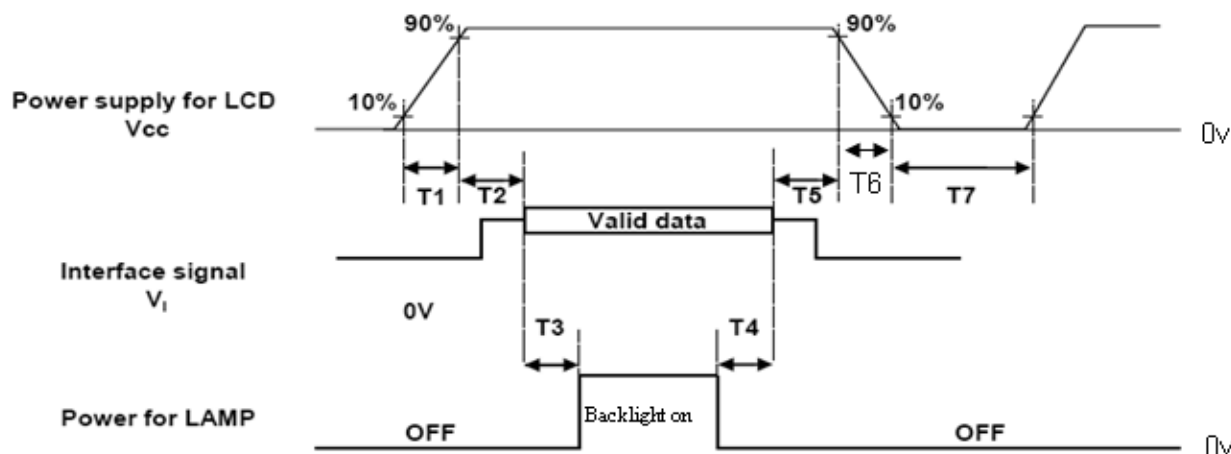


Note (3) The SSCG (Spread spectrum clock generator) is defined as below figures.



4.6 POWER ON/OFF SEQUENCE

The power sequence specifications are shown as the following table and diagram.



Timing Specifications:

Parameters	Values			Units
	Min	Typ.	Max	
T1	0.1		10	ms
T2	0	30	50	ms
T3	200	250		ms
T4	100	250		ms
T5	0	20	50	ms
T6	0.1		50	ms
T7	1000			ms

Note (1) The supply voltage of the external system for the module input should be the same as the definition of Vcc.

Note (2) When the backlight turns on before the LCD operation of the LCD turns off, the display may momentarily become abnormal screen.

Note (3) In case of VCC = off level, please keep the level of input signals on the low or keep a high impedance.

Note (4) T4 should be measured after the module has been fully discharged between power off and on period.

Note (5) Interface signal shall not be kept at high impedance when the power is on.

Note (6) CMI won't take any responsibility for the products which are damaged by the customers not following the Power Sequence.

Note (7) There might be slight electronic noise when LCD is turned off (even backlight unit is also off). To avoid this symptom, we suggest "Vcc falling timing" to follow "t6 spec".



5. OPTICAL CHARACTERISTICS

5.1 TEST CONDITIONS

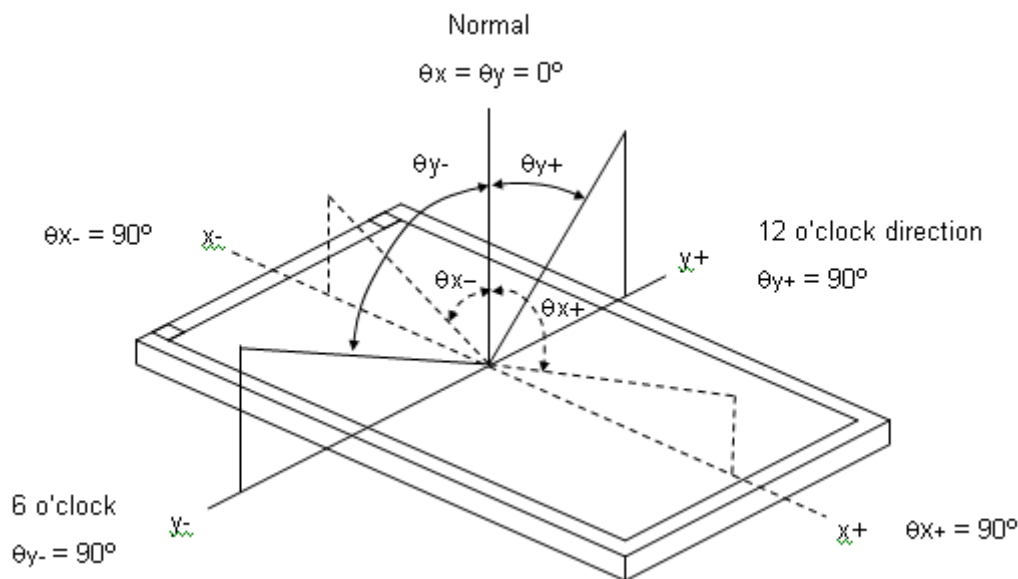
Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V _{CC}	5	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
LED Light Bar Input Current Per Input Pin	I _{PIN}	65 ± 3%	mA _{DC}
PWM Duty Ratio	D	100	%
LED Light Bar Test Converter	CMI TEST01001 T2-D1		

5.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 5.2. The following items should be measured under the test conditions described in 5.1 and stable environment shown in Note (5).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity (CIE 1931)	Red	R _x	$\theta_x=0^\circ, \theta_Y=0^\circ$ CS-2000 R=G=B=255 Gray scale	Typ – 0.03	0.645	Typ + 0.03	-	(1), (5)
		R _y			0.342			
	Green	G _x			0.309			
		G _y			0.620			
	Blue	B _x			0.151			
		B _y			0.059			
	White	W _x			0.313			
		W _y			0.329			
	Center Luminance of White (Center of Screen)				L _C			
Contrast Ratio		CR		700	1000	-	-	(2), (5)
Response Time		T _R	$\theta_x=0^\circ, \theta_Y=0^\circ$	-	1.3	2.2	ms	(3)
		T _F		-	3.7	5.8		
0		ΔW	$\theta_x=0^\circ, \theta_Y=0^\circ$	-	-	1.33	-	(5), (6)
Viewing Angle	Horizontal	θ _x - + θ _x +	CR ≥ 10	150	170	-	Deg.	(1), (5)
	Vertical	θ _y - + θ _y +		140	160	-		
Viewing Angle	Horizontal	θ _x - + θ _x +	CR ≥ 5	160	178	---	Deg.	(1), (5)
	Vertical	θ _y - + θ _y +		150	170	---		

Note (1) Definition of Viewing Angle (θ_x , θ_y):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

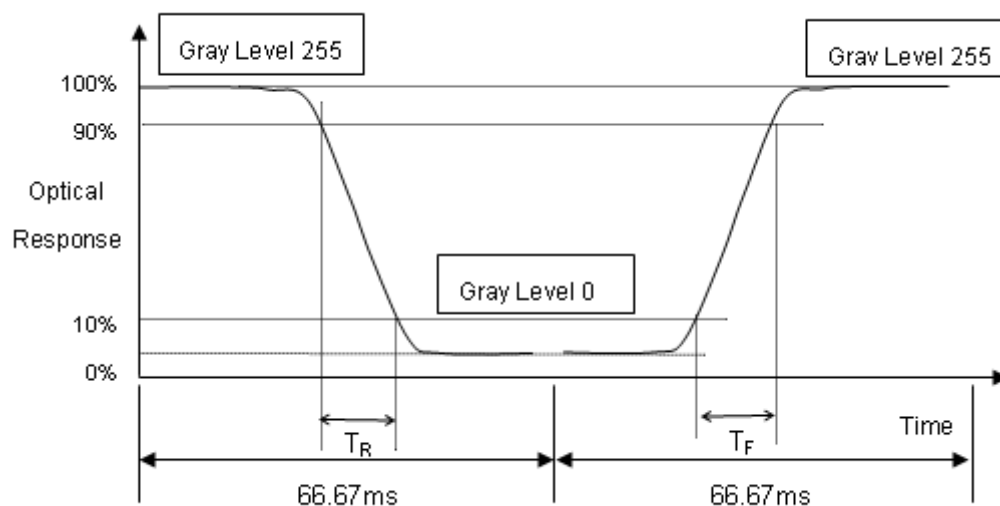
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

$$\text{CR} = \text{CR} (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time (T_R , T_F):



Note (4) Definition of Luminance of White (L_c):

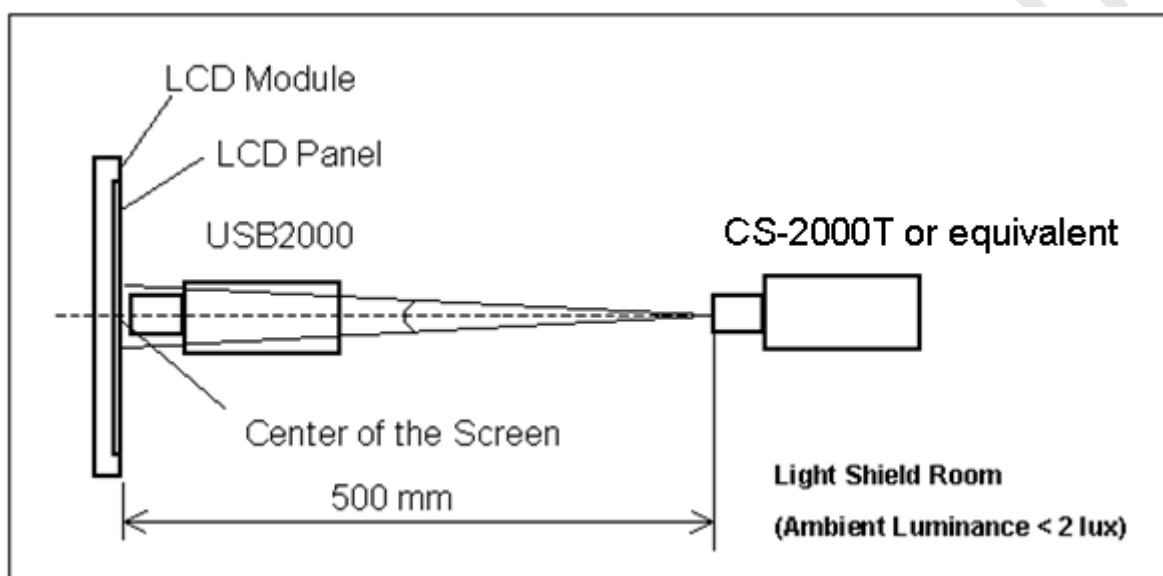
Measure the luminance of gray level 255 at center point

$$L_c = L(5)$$

$L(x)$ is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

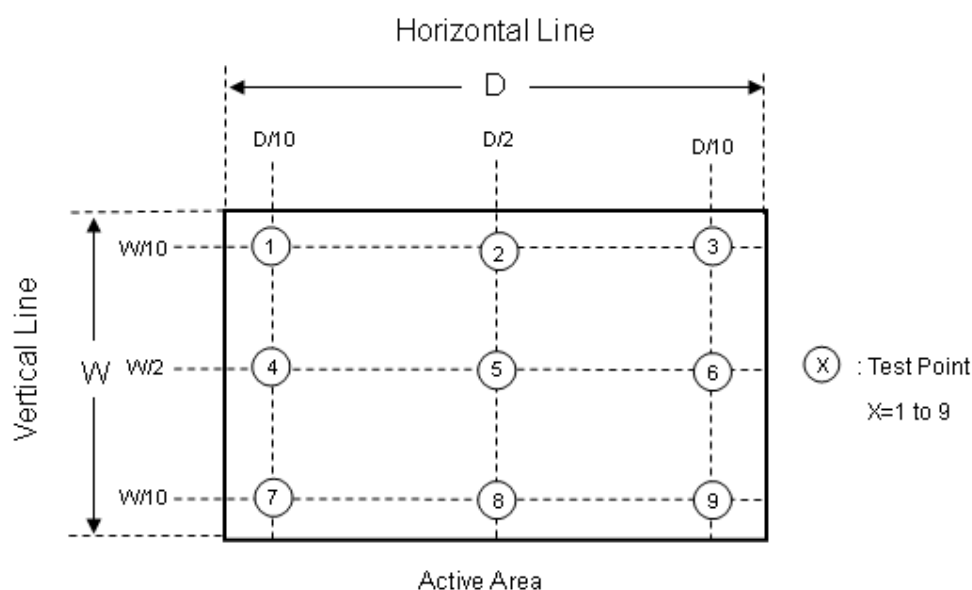
The LCD module should be stabilized at given temperature for 40 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 40 minutes in a windless room.



Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 9 points

$$\delta W = (\text{Minimum } [L(1) \sim L(9)] / \text{Maximum } [L(1) \sim L(9)]) * 100\%$$



6. RELIABILITY TEST ITEM

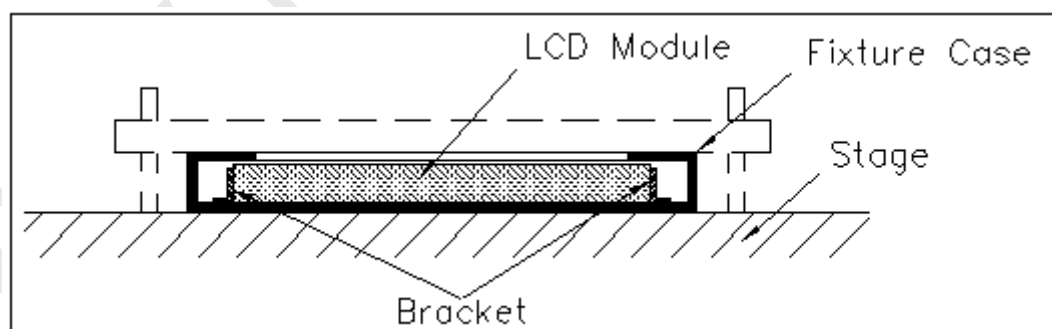
Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50℃ , 80%RH, 240hours	
High Temperature Operation (HTO)	Ta= 50℃ , 50%RH , 240hours	
Low Temperature Operation (LTO)	Ta= 0℃ , 240hours	
High Temperature Storage (HTS)	Ta= 60℃ , 240hours	
Low Temperature Storage (LTS)	Ta= -20℃ , 240hours	
Vibration Test (Non-operation)	Acceleration: 1.5 Grms Wave: Half-sine Frequency: 10 - 300 Hz Sweep: 30 Minutes each Axis (X, Y, Z)	
Shock Test (Non-operation)	Acceleration: 50 G Wave: Half-sine Active Time: 11 ms Direction : ± X, ± Y, ± Z.(one time for each Axis)	
Thermal Shock Test (TST)	-20℃/30min , 60℃ / 30min , 100 cycles	
On/Off Test	25℃ ,On/10sec , Off /10sec , 30,000 cycles	
ESD (Electro Static Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω)	
	Air Discharge: ± 15KV, 150pF(330Ω)	
Altitude Test	Operation:10,000 ft / 24hours Non-Operation:30,000 ft / 24hours	

Note (1) criteria : Normal display image with no obvious non-uniformity and no line defect.

Note (2) Evaluation should be tested after storage at room temperature for more than two hour

Note (3) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

The fixing condition is shown as below:



7. PACKING

7.1 PACKING SPECIFICATIONS

- (1) 11 LCD modules / 1 Box
- (2) Box dimensions: 567(L) X 278 (W) X 417 (H) mm
- (3) Weight: approximately: (28.8) Kg (11 modules per box)

7.2 PACKING METHOD

- (1) Carton Packing should have no failure in the following reliability test items.

Test Item	Test Conditions	Note
Vibration	ISTA STANDARD Random, Frequency Range: 1 – 200 Hz Top & Bottom: 30 minutes (+Z), 10 min (-Z), Right & Left: 10 minutes (X) Back & Forth 10 minutes (Y)	Non Operation
Dropping Test	1 Corner, 3 Edge, 6 Face, 30.5cm, (ISTA STANDARD)	Non Operation

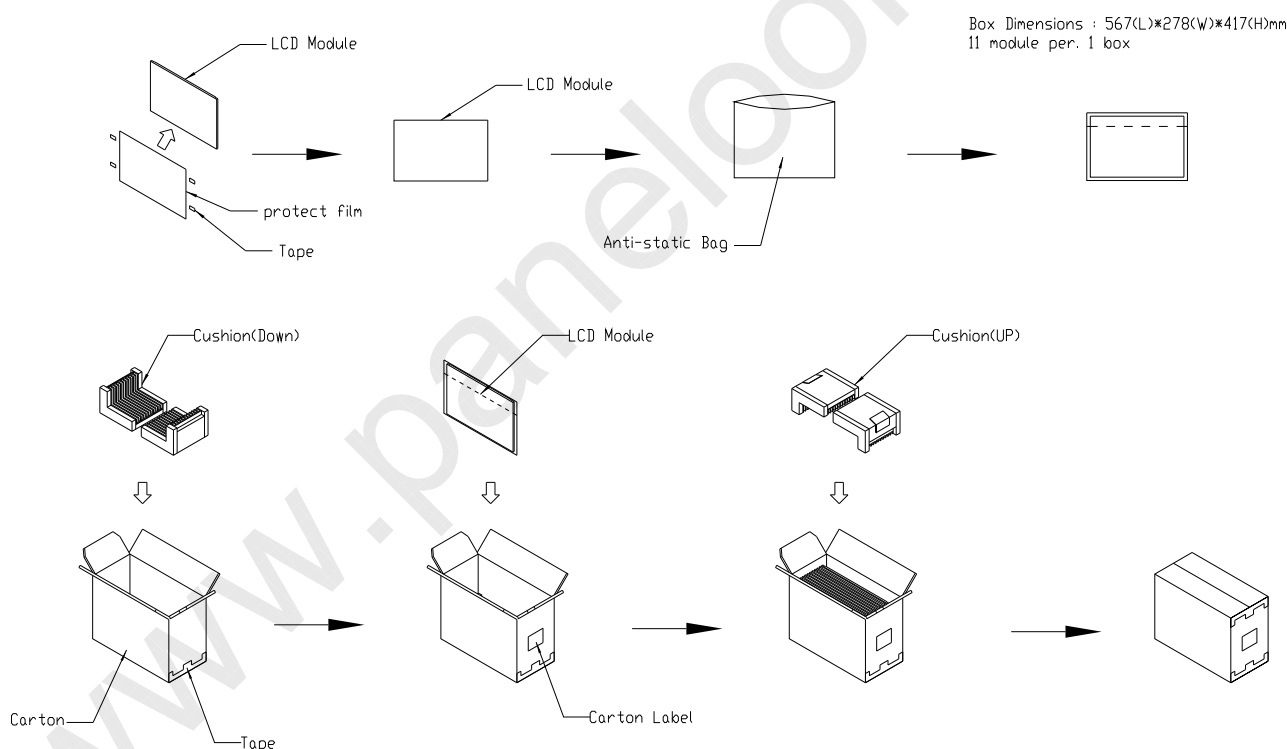
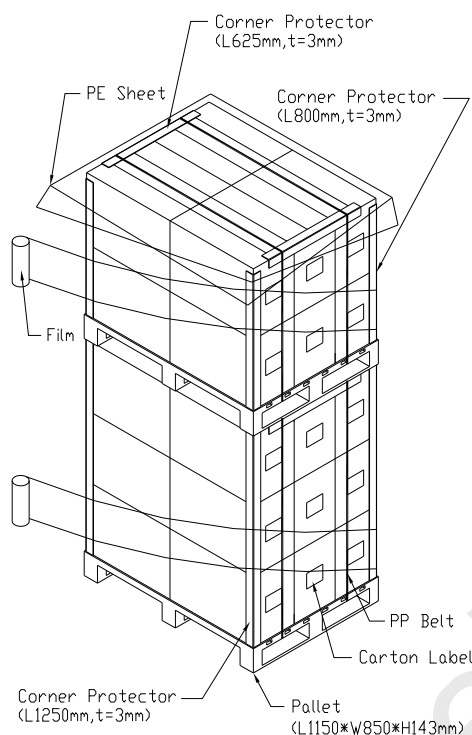


Figure. 7-1 Packing method

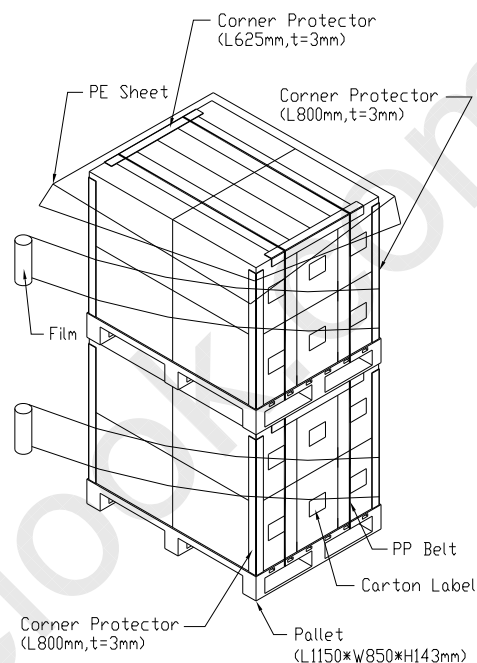


7.3 PALLET

Sea / Land Transportation
(40ft HQ Container)



Sea / Land Transportation
(40ft Container)



Air Transportation

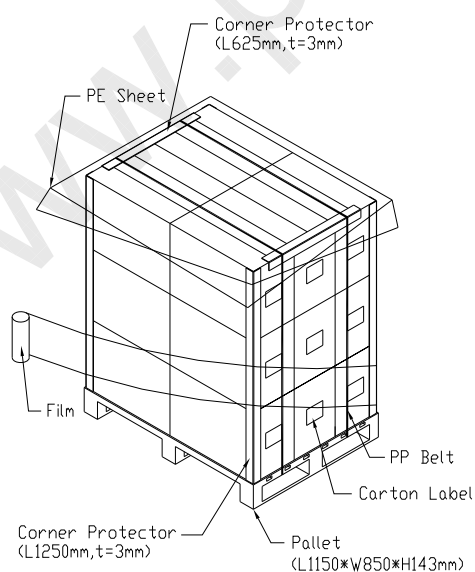


Figure. 7-2 Packing method

8. CMI MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



(a) Model Name: M220ZGE-L20

(b) Revision: Rev. XX, for example: A0, A1... B1, B2... or C1, C2...etc.

(c) CMI barcode definition:

Serial ID: XX-XX-X-XX-YMD-L-NNNN

Code	Meaning	Description
XX	CMI internal use	-
XX	Revision	Cover all the change
X	CMI internal use	-
XX	CMI internal use	-
YMD	Year, month, day	Year: 0~9, 2001=1, 2002=2, 2003=3...2010=0, 2011=1, 2012=2... Month: 1~12=1, 2, 3, ~, 9, A, B, C
L	Product line #	Line 1=1, Line 2=2, Line 3=3, ...
NNNN	Serial number	Manufacturing sequence of product

(d) Customer's barcode definition:

Serial ID: CM-M0E20-X-X-X-XX-L-XX-L-YMD-NNNN

Code	Meaning	Description
CM	Supplier code	CMI=CM
M0E20	Model number	M220ZGE-L20= M0E20
X	Revision code	Non ZBD: 1,2,~,8,9 / ZBD: A~Z
X	Source driver IC code	Century=1, CLL=2, Demos=3, Epson=4, Fujitsu=5, Himax=6, Hitachi=7, Hynix=8, LDI=9, Matsushita=A, NEC=B, Novatec=C, OKI=D, Philips=E, Renasas=F, Samsung=G, Sanyo=H, Sharp=I, TI=J, Topro=K, Toshiba=L, Windbond=M, ILITEK=Q, Fiti=Y, None IC =Z
X	Gate driver IC code	
XX	Cell location	Tainan Taiwan=TN, Ningbo China=CN, Hsinchu Taiwan=SC
L	Cell line #	1,2,~,9,A,B,~,Y,Z
XX	Module location	Tainan, Taiwan=TN ; Ningbo China=NP, Shenzhen China=SH
L	Module line #	1,2,~,9,A,B,~,Y,Z
YMD	Year, month, day	Year: 0~9, 2001=1, 2002=2, 2003=3...2010=0, 2011=1, 2012=2... Month: 1~12=1, 2, 3, ~, 9, A, B, C Day: 1~31=1, 2, 3, ~, 9, A, B, C, ~, T, U, V
NNNN	Serial number	By LCD supplier



(e) FAB ID(UL Factory ID):

Region	Factory ID
TWCM1	GEMN
NBCMI	LEOO
NBCME	CANO
NHCM1	CAPG

9. PRECAUTIONS

9.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.
- (4) Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
- (5) Do not pull the I/F connector in or out while the module is operating.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.
- (9) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
- (10) When ambient temperature is lower than 10°C may reduce the display quality. For example, the response time will become slowly.

9.2 STORAGE PRECAUTIONS

- (1) Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0°C to 35°C and relative humidity of less than 70%
- (2) Do not store the TFT – LCD module in direct sunlight
- (3) The module should be stored in dark place. It is prohibited to apply sunlight or fluorescent light in storing

9.3 OPERATION PRECAUTIONS

- (1) The LCD product should be operated under normal condition.

Normal condition is defined as below :

Temperature : 20±15°C

Humidity: 65±20%

Display pattern : continually changing pattern(Not stationary)

- (2) If the product will be used in extreme conditions such as high temperature, high humidity, high altitude, display pattern or operation time etc... It is strongly recommended to contact CMI for application engineering advice. Otherwise, its reliability and function may not be guaranteed.

9.4 SAFETY PRECAUTIONS

- (1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (2) After the module's end of life, it is not harmful in case of normal operation and storage.

9.5 SAFETY STANDARDS

The LCD module should be certified with safety regulations as follows:

- (1) UL60950-1 or updated standard.
- (2) IEC60950-1 or updated standard.

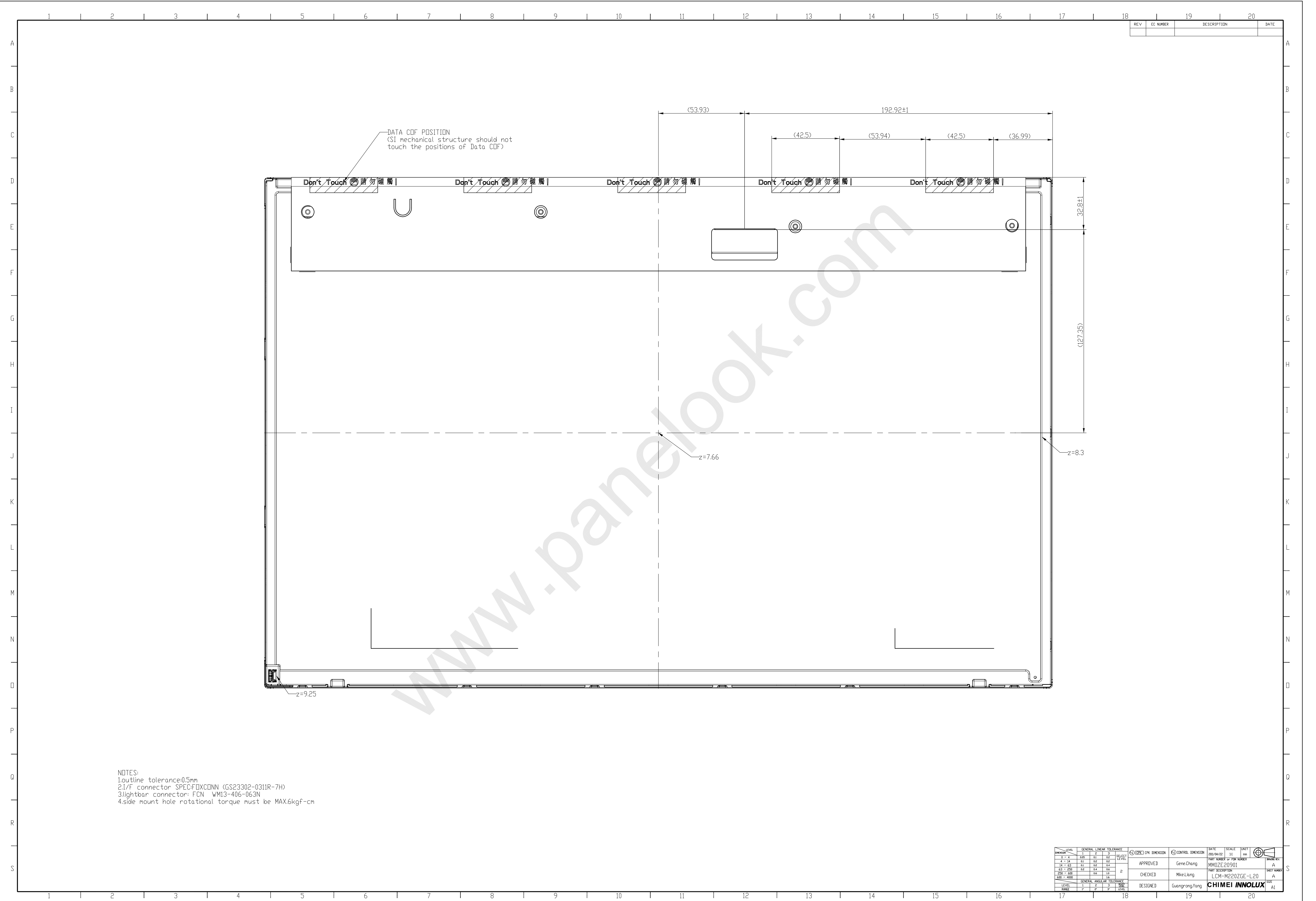
9.6 OTHER

When fixed patterns are displayed for a long time, remnant image is likely to occur.

Appendix. OUTLINE DRAWING

INCHES		GENERAL LINEAR TOLERANCE				Ø (HOLE) CPK DIMENSION		Ø (CONTROL) DIMENSION		DATE	SCALE	UNIT	FIG. NO.	DRAWING REV.	
LEVEL		1	2	3	4	5	6	7	8	2024/04/02	1:1	MM			
0 - 4	0.05	0.1	0.2	0.3	0.4	0.5	0.6	APPROVED	Gene.Chang	PART NUMBER				MMQZ02901	SHEET NUMBER
4 - 14	0.1	0.2	0.3	0.4	0.5	0.6	0.7	CHECKED	Mike.Liang	PART DESCRIPTION				LCM-M20Z02E-L20	
14 - 50	0.15	0.2	0.3	0.4	0.5	0.6	0.7								
63 - 250	0.2	0.4	0.6	0.8	1.0	1.2	1.5								
250 - 600	0.3	0.6	1.0	1.5	2.0	2.5	3.0								
600 - 1000	0.4	0.8	1.2	1.8	2.5	3.0	3.6								
GENERAL ANGLE TOLERANCE		GENERAL SURFACE TOLERANCE		DESIGNED		DRAWING		CHIMEI INNOX		SIZE				A1	
LEVEL		1	2	3	4	5	6								
NAME								Guangrong.Yong							

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DIMENSION	GENERAL LINEAR TOLERANCE				SELECT LEVEL	APPROVED	CHECKED	DESIGNED	DATE	SCALE	UNIT	DRAWN BY	SHEET NUMBER
	1	2	3	4									
0 ~ 4	0.05	0.1	0.2	0.5	1	APPROVED		Gene.Chang	2013/04/22	1:1	mm	11	1
4 ~ 16	0.1	0.2	0.5	1	2	CHECKED		Mike.Liang	PART NUMBER OF PCB NUMBER		MM02E20901		
16 ~ 50	0.2	0.5	1	2	3	DESIGNED		Guangrong.Yang	PART DESCRIPTION		LCM-M220ZGE-L20		
50 ~ 100	0.5	1	2	5	4								
100 ~ 400	1	2	5	10	5								
400 ~ 600	2	5	10	20	6								
600 ~ 800	3	8	15	30	7								
800 ~ 1000	4	10	20	40	8								
1000 ~ 1500	5	15	30	60	9								
1500 ~ 2000	6	20	40	80	10								
2000 ~ 2500	7	25	50	100	11								
2500 ~ 3000	8	30	60	120	12								
3000 ~ 4000	9	40	80	160	13								
4000 ~ 5000	10	50	100	200	14								
5000 ~ 6000	11	60	120	250	15								
6000 ~ 7000	12	70	140	300	16								
7000 ~ 8000	13	80	160	350	17								
8000 ~ 9000	14	90	180	400	18								
9000 ~ 10000	15	100	200	450	19								
10000 ~ 12000	16	120	240	550	20								
12000 ~ 15000	17	150	300	700	21								
15000 ~ 20000	18	200	400	900	22								
20000 ~ 25000	19	250	500	1100	23								
25000 ~ 30000	20	300	600	1300	24								
30000 ~ 40000	21	400	800	1700	25								
40000 ~ 50000	22	500	1000	2200	26								
50000 ~ 60000	23	600	1200	2700	27								
60000 ~ 70000	24	700	1400	3200	28								
70000 ~ 80000	25	800	1600	3700	29								
80000 ~ 90000	26	900	1800	4200	30								
90000 ~ 100000	27	1000	2000	4700	31								
100000 ~ 120000	28	1200	2400	5700	32								
120000 ~ 150000	29	1500	3000	7200	33								
150000 ~ 200000	30	2000	4000	9000	34								
200000 ~ 250000	31	2500	5000	11000	35								
250000 ~ 300000	32	3000	6000	13000	36								
300000 ~ 400000	33	4000	8000	17000	37								
400000 ~ 500000	34	5000	10000	22000	38								
500000 ~ 600000	35	6000	12000	27000	39								
600000 ~ 700000	36	7000	14000	32000	40								
700000 ~ 800000	37	8000	16000	37000	41								
800000 ~ 900000	38	9000	18000	42000	42								
900000 ~ 1000000	39	10000	20000	47000	43								
1000000 ~ 1200000	40	12000	24000	57000	44								
1200000 ~ 1500000	41	15000	30000	72000	45								
1500000 ~ 2000000	42	20000	40000	90000	46								
2000000 ~ 2500000	43	25000	50000	110000	47								
2500000 ~ 3000000	44	30000	60000	130000	48								
3000000 ~ 4000000	45	40000	80000	170000	49								
4000000 ~ 5000000	46	50000	100000	220000	50								
5000000 ~ 6000000	47	60000	120000	270000	51								
6000000 ~ 7000000	48	70000	140000	320000	52								
7000000 ~ 8000000	49	80000	160000	370000	53								
8000000 ~ 9000000	50	90000	180000	420000	54								
9000000 ~ 10000000	51	100000	200000	470000	55								
10000000 ~ 12000000	52	120000	240000	570000	56								
12000000 ~ 15000000	53	150000	300000	720000	57								
15000000 ~ 20000000	54	200000	400000	900000	58								
20000000 ~ 25000000	55	250000	500000	1100000	59								
25000000 ~ 30000000	56	300000	600000	1300000	60								
30000000 ~ 40000000	57	400000	800000	1700000	61								
40000000 ~ 50000000	58	500000	1000000	2200000	62								
50000000 ~ 60000000	59	600000	1200000	2700000	63								
60000000 ~ 70000000	60	700000	1400000	3200000	64								
70000000 ~ 80000000	61	800000	1600000	3700000	65								
80000000 ~ 90000000	62	900000	1800000	4200000	66								
90000000 ~ 100000000	63	1000000	2000000	4700000	67								
100000000 ~ 120000000	64	1200000	2400000	5700000	68								
120000000 ~ 150000000	65	1500000	3000000	7200000	69								
150000000 ~ 200000000	66	2000000	4000000	9000000	70								
200000000 ~ 250000000	67	2500000	5000000	11000000	71								
250000000 ~ 300000000	68	3000000	6000000	13000000	72								
300000000 ~ 400000000	69	4000000	8000000	17000000	73								
400000000 ~ 500000000	70	5000000	10000000	22000000	74								
500000000 ~ 600000000	71	6000000	12000000	27000000	75								
600000000 ~ 700000000	72	7000000	14000000	32000000	76								
700000000 ~ 800000000	73	8000000	16000000	37000000	77								
800000000 ~ 900000000	74	9000000	18000000	42000000	78								
900000000 ~ 1000000000	75	10000000	20000000	47000000	79								
1000000000 ~ 1200000000	76	12000000	24000000	57000000	80								
1200000000 ~ 1500000000	77	15000000	30000000	72000000	81								
1500000000 ~ 2000000000	78	20000000	40000000	90000000	82								
2000000000 ~ 2500000000	79	25000000	50000000	110000000	83								
2500000000 ~ 3000000000	80	30000000	60000000	130000000	84								
3000000000 ~ 4000000000	81	40000000	80000000	170000000	85								
4000000000 ~ 5000000000	82	50000000	100000000	220000000	86								
5000000000 ~ 6000000000	83	60000000	120000000	270000000	87								
6000000000 ~ 7000000000	84	70000000	140000000	320000000	88								
7000000000 ~ 8000000000	85	80000000	160000000	370000000	89								
8000000000 ~ 9000000000	86	90000000	180000000	420000000	90								
9000000000 ~ 10000000000	87	100000000	200000000	470000000	91								
10000000000 ~ 12000000000	88	120000000	240000000	570000000	92								
12000000000 ~ 15000000000	89	150000000	300000000	720000000	93								
15000000000 ~ 20000000000	90	200000000	400000000	900000000	94								
20000000000 ~ 25000000000	91	250000000	500000000	1100000000	95								
25000000000 ~ 30000000000	92	300000000	600000000	1300000000	96								
30000000000 ~ 40000000000	93	400000000	800000000	1700000000	97								
40000000000 ~ 50000000000	94	500000000	1000000000	2200000000	98								
50000000000 ~ 60000000000	95	600000000	1200000000	2700000000	99								
60000000000 ~ 70000000000	96	700000000	1400000000	3200000000	100								
70000000000 ~ 80000000000	97	800000000	1600000000	3700000000	101								
80000000000 ~ 90000000000	98	900000000	1800000000	4200000000	102								
90000000000 ~ 100000000000	99	1000000000	2000000000	4700000000	103								
100000000000 ~ 120000000000	100	1200000000	2400000000	5700000000	104								
120000000000 ~ 150000000000	101	1500000000	3000000000	7200000000	105								
150000000000 ~ 200000000000	102	2000000000	4000000000	9000000000	106								
200000000000 ~ 250000000000	103	2500000000	5000000000	11000000000	107								
250000000000 ~ 300000000000	104	3000000000	6000000000	13000000000	108								
300000000000 ~ 400000000000	105	4000000000	8000000000	17000000000	109								
400000000000 ~ 500000000000	106	5000000000	10000000000	22000000000	110								
500000000000 ~ 600000000000	107	6000000000	12000000000	27000000000	111								
600000000000 ~ 700000000000	108	7000000000	14000000000	32000000000	112								
700000000000 ~ 800000000000	109	8000000000	16000000000	37000000000	113								
800000000000 ~ 900000000000	110	9000000000	18000000000	42000000000	114								
900000000000 ~ 1000000000000	111	10000000000	20000000000	47000000000	115								
1000000000000 ~ 1200000000000	112	12000000000	24000000000	57000000000	116								
1200000000000 ~ 1500000000000	113	15000000000	30000000000	72000000000	117								
1500000000000 ~ 2000000000000	114	20000000000	40000000000	90000000000	118								
2000000000000 ~ 2500000000000	115	25000000000	50000000000	110000000000	119								
2500000000000 ~ 3000000000000	116	30000000000	60000000000	130000000000	120								
3000000000000 ~ 4000000000000	117	40000000000	80000000000	170000000000	121								
400000													